

REVISION OF THE NEW ZEALAND POLYPLACOPHORA.

By HENRY SUTER, Christchurch, New Zealand.

Read 8th January, 1897.

EVER since the publication of Mr. H. A. Pilsbry's Monograph on the Polyplacophora, the collecting and studying of Chitons have been my special hobby. I have been fortunate enough to collect in different parts of New Zealand, and thus have brought together a good number of specimens. Other circumstances have also been favourable to the investigation of our Chitons. In 1894-5 Mr. T. F. Cheeseman, Curator of the Auckland Museum, commissioned me to rearrange the collections of shells, fossils, etc., in the Museum, and I had, of course, a good opportunity to collect and study the Chitons of the Auckland province. In December, 1895, I availed myself of a kind invitation from Mr. A. Hamilton, Registrar of the Otago University, Dunedin, and spent several weeks in the examination of his large conchological collection, and he kindly presented me with specimens, amongst which were some Chitons of special interest. Professor T. J. Parker, Curator of the Otago Museum, was good enough to send me all the New Zealand Polyplacophora in the Museum for investigation; Sir James Hector, Director of the Colonial Museum, Wellington, with great liberality lent me some of the type-specimens mentioned in Captain Hutton's paper on the New Zealand Chitonidæ (Trans. New Zealand Inst., vol. iv); and last, but not least, Captain F. W. Hutton, Curator of the Canterbury Museum, has always kindly allowed me to examine specimens in the Museum, and has greatly helped me in my studies with his large store of knowledge and experience. I wish here to express my gratitude to all these gentlemen for the help accorded me in this special work.

I must also say that this revision of the New Zealand Chitons would almost have been an impossibility without the elaborate monograph of Mr. H. A. Pilsbry. The identification of several of our Chitons, however, was not quite satisfactory, the occurrence of certain species in New Zealand waters was doubtful, and so on.

I hope that I have succeeded in this short paper in clearing up some of the dubious points, and in giving a reliable list.

Captain Hutton's list of the New Zealand Chitonidæ, published in 1872 (Trans. New Zealand Inst., vol. iv), contains twenty-one species, of which, however, one is a synonym and three are questionable for New Zealand. E. von Martens, in his "Critical List of the Mollusca of New Zealand" (1873), enumerates seventeen species; and Captain Hutton, in the "Manual of the New Zealand Mollusca," brings the list up to twenty-eight species, six of which, however, have to be omitted as being synonyms or doubtful for our colony.

The present list includes ten genera, with twenty-nine species, all of which I have seen, except *Plaxiphora oblecta*, *P. superba*, and *Spongiolithon productus*.

LEPIDOPLEURUS, Risso, 1826.

1. LEPIDOPLEURUS INQUINATUS (Reeve).

Chiton inquinatus, Reeve: Conch. Icon., t. xxiii, fig. 154 (May, 1847).
Ischnochiton inquinatus (Reeve): Pilsbry, Man. Conch., ser. I, vol. xiv,
 p. 90, pl. xviii, figs. 49, 50.

When collecting in Auckland Harbour, I found a number of examples of this little *Chiton* on the under-side of stones on a mudflat at low-water. Specimens were also in the Museum, labelled *Chiton sulcatus*, Quoy & Gaim. On examination I found it to be a *Lepidopleurus*, and thinking it to be a new species, I sent in May, 1895, a number of specimens in alcohol to Mr. H. A. Pilsbry, for further investigation. In January, 1896, Pilsbry published a note (*Nautilus*, vol. ix, p. 108) on this species, saying that it had been identified by Mr. E. R. Sykes as Reeve's *Chiton inquinatus* on comparing it with the type in the British Museum. Mr. E. R. Sykes also published a note on the species in our "Proceedings" (antea, p. 86).

Hab.—Auckland Harbour (H. S.); Brighton, Otago (A. Hamilton).

The species has also been found in Tasmania (Reeve's type), South Australia (Bednall), and Port Phillip, Victoria (Wilson).

CALLOCHITON, Gray, 1847.

KEY TO SPECIES.

- | | |
|---|---|
| <p><i>A.</i> Entire surface delicately shagreened.</p> <p><i>B.</i> Central areas with elevated, separate threads, parallel to jugum.</p> <p><i>C.</i> A row of deep longitudinal pits in front of lateral areas.</p> | <p><i>platessa.</i></p> <p><i>illuminatus.</i></p> <p><i>empleurus.</i></p> |
|---|---|

2. CALLOCHITON PLATESSA (Gould).

Chiton platessa, Gould: Proc. Bost. Soc. Nat. Hist., vol. ii, p. 143 (1846); U.S. Expl. Exp., p. 320, atlas, figs. 434, 434a; Otia, p. 4.

Lepidopleura platessa, Gould: Otia (Rectifications), 1862, p. 242.

Callochiton platessa, Gould: Haddon, "Challenger" Report, p. 15; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 49, pl. x, figs. 1-5; Pilsbry, Proc. Acad. Nat. Sci. Philad., 1894, p. 71.

Chiton crocinus, Reeve: Conch. Icon., t. xxii, fig. 146 (1847).

Callochiton crocinus, Reeve: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 50, pl. x, fig. 7; vol. xv, p. 67.

Chiton versicolor, A. Adams: Proc. Zool. Soc., 1852, p. 92, pl. xvi, fig. 5.

Leptochiton versicolor, A. Adams: Angas, Proc. Zool. Soc., 1867, p. 223.

Lepidopleurus empleurus, Hutton: Sykes, Proc. Mal. Soc. London, vol. ii, p. 86, *pars*.

At the end of the description of his *Chiton empleurus*, Captain Hutton says: "Founded on two specimens in the Colonial Museum, locality not stated." Sir James Hector having kindly placed most of Captain

Hutton's types at my disposal, I found that on the glass tablet labelled "*Chiton empleurus*" there were not only two specimens, but also two species. One of them is Hutton's *C. empleurus*, but the larger specimen I found to correspond exactly with specimens of *C. platessa*, from Port Jackson, kindly given me by Dr. J. Cox. There is no doubt that both specimens were obtained from the same locality, and as *C. empleurus*, known only from the unique type-specimen, is very likely a New Zealand species, I include *C. platessa* in the New Zealand fauna, although it has not been found again by recent collectors. Captain Hutton told me that Captain Fairchild dredged largely, especially in Cook Strait, and that these specimens may have been obtained by him and presented to the Colonial Museum.

3. CALLOCHITON ILLUMINATUS (Reeve).

Chiton illuminatus, Reeve: Conch. Icon., t. xxii, fig. 147 (1847).

Chiton (Callochiton) illuminatus, Reeve: E. A. Smith, Proc. Zool. Soc., 1881, p. 35.

Lepidopleurus illuminatus, Reeve: Rochebrune, Miss. Scient. Cape Horn, p. 141.

Callochiton illuminatus, Reeve: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 51, pl. ix, figs. 92-4.

A small specimen is in the Canterbury Museum, and was kindly submitted to me for examination by Captain Hutton. Since there is only one specimen I was not allowed to separate the valves; but, so far as examination was possible, I found it to agree perfectly with the description and figures of *Callochiton illuminatus* in Pilsbry's Man. Conch. The colour is not red, but greenish-grey; however, the same variability in colour is met with in *Chiton canaliculatus* and others. Central areas with eight separate threads on each side; end valves and lateral areas minutely granulose; median valves with one slit. Girdle-scales those characteristic of the genus, rather large. Interior greyish-white; sinus shallow. Length about 10, breadth 7 mm.; divergence 120°.

Hab.—Dredged off Kapiti Island, Cook Strait.

This is a most interesting addition to the fauna of New Zealand.

4. CALLOCHITON EMPLEURUS (Hutton).

Chiton empleurus, Hutton: Trans. New Zealand Inst., vol. iv, p. 178 (1872).

Lepidopleurus empleurus, Hutton: Man. New Zealand Moll., 1880, p. 113.

Callochiton crocinus, Reeve: Pilsbry, Man. Conch., ser. I, vol. xv, p. 67.

The elongated form and the deep longitudinal pits along the anterior edge of the lateral areas, distinguish this species at once from *C. platessa*, with which it has been supposed to be identical. In Hutton's diagnosis the word "sometimes," that precedes "with a row of deep pits, etc.," must be struck out. There are 9-10 pits on

each side. *C. empleurus* seems somewhat to approach *Ischnochiton* (or *Callochiton*?) *punicus*, Couth., which latter, however, I have not seen. I have nothing to add to Hutton's description, because the type-specimen could not be taken to pieces, and the classification of the species rests only on the character of the girdle-scales, which are very similar to those of *C. platessa*.

Hab.—Unknown; but, as already mentioned, most likely Cook Strait.

ISCHNOCHITON, Gray, 1847.

KEY TO SPECIES.

Scales of girdle faintly striated, mingled with non-striated scales.	<i>longicymba</i> .
All scales of girdle deeply grooved, 3-4 grooves on a scale.	<i>Parkeri</i> .

5. ISCHNOCHITON LONGICYMBA (Quoy & Gaimard).

- ? *Chiton longicymba*, Blainville: Dict. Sci. Nat., vol. xxxvi, p. 542.
Chiton longicymba, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 390, t. lxxv, figs. 1-18; Reeve, Conch. Icon., t. xix, fig. 125; t. xxiv, fig. 163d.
Lepidopleurus longicymba, Blainville: Angas, Proc. Zool. Soc., 1867, p. 222.
Chiton (*Lepidopleurus*) *longicymbus*, Blainville: Hutton, Trans. New Zealand Inst., vol. iv, p. 178.
Lepidopleurus longicymbus, Blainville: Hutton, Man. New Zealand Moll., p. 113.
Ischnochiton longicymba, Quoy & Gaim.: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 87, pl. xxii, figs. 58-66.

The colour of this species seems to be even more variable than that of *Ischnochiton crispus*, from Tasmania and Australia. In the South the variation is less considerable, and large specimens are rare. Examples in the Otago Museum from Auckland Islands and Campbell Island are whitish, from Dunedin blackish.

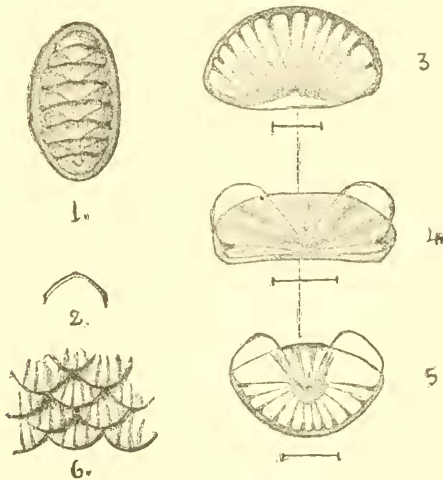
Hab.—The whole of New Zealand, but more abundant in the North.

6. ISCHNOCHITON PARKERI, n.sp.

Lepidopleurus circumvallatus, Reeve: Hutton, Man. New Zealand Moll., p. 113 (*non* Reeve).

Shell oblong, highly and angularly arched. Colour very variable, from horny-yellow to chestnut-brown, mostly darker on the posterior margin of the valves, with more or less predominant black longitudinal stripes, assuming often a triangular shape, closer together or coalescing towards the girdle; the jugum with only a few or without black markings. Lateral areas distinct, raised, minutely granulated, and with three to four concentric, flat, impressed ridges, which are sometimes crossed by faint radiating riblets, their number being from 8-10.

Central area closely and finely quincuncially granulate, the anteriorly divergent rows predominating. End valves minutely decussate, with two concentric ridges, which are rendered granulose by numerous radiate riblets. Mucro of tail valve central, low, and obtuse, posterior slope slightly concave. Girdle of the same colour as the jugum, covered densely with small imbricating scales, all of about the same size; they are flatly convex and deeply grooved, 3-4 grooves on each. The margin of girdle beset with a fringe of minute spicules. Interior blue. Anterior valve with 11-13, central 1, posterior 12-13 slits; the teeth are sharp and smooth. The posterior margin of intermediate valves slightly beaked and denticulate; posterior tooth short, as in *Ischnochiton longicymba*. Eaves solid. Sinus broad, flat, smooth, channelled on each side on the inner surface of the sutural plates. Length 21, breadth 12 mm.; divergence 120°.



Ischnochiton Parkeri, n.sp.

1. Dorsal view of shell, nat. size.
2. Posterior view of central valve, nat. size.
- 3-5. Anterior, median, and posterior valves, enlarged.
6. Portion of girdle, magnified.

Hab.—Auckland Islands; Campbell Island.

Type in the Otago University Museum. Described from spirit specimens kindly sent me by Professor T. J. Parker, F.R.S., Dunedin, and I have much pleasure in associating his name with the species.

Specimens from Campbell Island, also in the Otago Museum, are of a light-brown colour, and were mistaken for *C. circumvallatus*, Reeve.

This species may be *Lepidopleurus melanterus*, Rocheb., one of the many insufficiently described species.

PLAXIPHORA, Gray, 1847.

KEY TO SPECIES.

- a. Valves exposed.
- b. Posterior valve not greatly reduced in size or altered in form.
- c. Central areas unsculptured save for growth-lines.
- d. Sutural pores or tufts distinctly developed.
- e. Lateral areas with subobsolete radiating riblets. *superba.*
- cc. Lateral areas with at least two distinct radiate ribs. *subatrata.*
- dd. Sutural pores absent, girdle densely covered with bristles. *Suteri.*
- cc. Central areas sculptured, at least at the sides.
- d. Large. Sutural pores with bifurcating bristles; girdle broad, reddish. *biramosa.*
- dd. Small. Sutural pores with more than two bristles; girdle narrow, white or white and black. *calata.*
- bb. Posterior valve reduced to a narrow crescentic form, strongly arched upward. *ovata.*
- aa. Valves partially immersed in the girdle, which encroaches at the sutures. *obtecta.*

7. PLAXIPHORA BIRAMOSA (Quoy & Gaimard).

Chiton biramosus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 378, t. lxxiv, figs 12-16.

Acanthochates biramosus, Quoy & Gaim.: Hutton, Trans. New Zealand Inst., vol. iv, p. 181.

Plaxiphora biramosa, Quoy & Gaim.: Hutton, Man. New Zealand Moll., p. 116; Pilsbry, Man. Conch., ser. 1, vol. xiv, p. 319, pl. lxxviii, figs. 51-4.

Young specimens I always found to be sculptured like *P. calata*, only more grotesquely, but in adult specimens the sculpturing is generally more or less effaced. Sometimes there is a beautiful ornamentation with green, pink, white, and red-brown, but as a rule the valves are covered with coralline growth and seaweeds, which render it very difficult to distinguish the animals from their surroundings. The colour of the girdle varies very much with age; in young specimens it is sometimes of a dirty orange, whilst in adult forms it is dark red-brown. A feature that has hitherto been overlooked is the notch at the posterior end of the girdle; this, however, is not always very distinct. In some young shells I found it to be deep and broad, but in adult specimens mostly reduced to a more or less deep slit. I have met with a specimen measuring 60 by 40 mm., divergence 150°.

Hab.—Wellington (Otago Museum); near Lyttelton (H. S.).

P. biramosa is one of the very rare New Zealand species. The specimen in the Otago Museum from Campbell Island, labelled *P. biramosa*, is not that species, but *P. subatrata*.

8. PLAXIPHORA SUPERBA, Pilsbry.

Plaxiphora superba, Cpr. MS.: Pilsbry, Man. Conch., ser. 1, vol. xiv (1893), p. 319, pl. lxxviii, figs. 55-61.

I have not seen this species, but cannot share Mr. Pilsbry's opinion that it is identical with *P. biramosa*. The shape of the valves and sutural laminae is very different; the divergence is only 110° , whilst it is 150° in *P. biramosa*. It is no doubt nearer *P. subatrata*, though specifically distinct from that also.

9. PLAXIPHORA CÆLATA (Reeve).

Chiton cælatus, Reeve: Conch. Icon., t. xvii (1847), fig. 101.

Acanthopleura cælatus, Reeve: Hutton, Man. New Zealand Moll., p. 115.

Plaxiphora cælata, Reeve: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 328, pl. lviii, figs. 21, 22.

Tonicia ziczac, Hutton: Trans. New Zealand Inst., vol. iv (1872), p. 180; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 328.

Chiton (Plaxiphora) terminalis (Cpr. MS.), Smith: Voy. "Erebus" and "Terror," Moll. (1874), p. 4, t. i, fig. 13.

Plaxiphora terminalis, Smith: Hutton, Man. New Zealand Moll., p. 116; (Cpr.) Smith, Pilsbry, Man. Conch., ser. I, vol. xiv, p. 326, pl. li, fig. 14.

I have collected a fair number of this species, and on examining them carefully have come to the conclusion that Smith's *Chiton terminalis* is identical with Reeve's *C. cælatus*. I have two specimens "ornamented with green and pink," but in all other respects they agree with the very good description and figure given by Smith for *Plaxiphora terminalis*. With regard to Hutton's *Tonicia ziczac*, there is no possibility of examining the type, which is lost, but on reading his description one is forced to the conclusion that it, too, cannot be anything but *Plaxiphora cælata*. Moreover, Captain Hutton himself made his *Tonicia ziczac* a synonym of the latter in his Man. New Zealand Moll. In Von Marten's Critical List I cannot find any mention that *T. ziczac* is a synonym of *P. cælata*, as stated by Pilsbry (Man. Conch., ser. I, vol. xiv, p. 328).

In his paper on the Polyplacophora from Port Phillip, Mr. E. R. Sykes places *Plaxiphora terminalis* in the synonymy of *P. petholata* (antea, p. 90). There is no doubt that the two species show very much the same sculpture, but, omitting minor differences, I would point out that the girdle of *P. cælata* (= *terminalis*) has very distinct sutural pores with long horny bristles, which are not at all numerous, and the colour of the girdle is usually white, banded with black. The girdle of *P. petholata*, on the other hand, is dark-brown, and it is densely covered with corneous, or dark-brown bristles, not arranged in series or sutural pores. *P. cælata* is a much more elongated form, and very seldom attains such a large size as *P. petholata*.¹

¹ [Mr. Suter has very kindly sent me fresh specimens of *P. cælata*, and I am very glad to have the opportunity of correcting the error into which I fell. The three names for the Australian shells appear to belong to one species, *P. petholata*, and the three names for the New Zealand shells to another, *P. cælata*.—E. R. Sykes.]

We find the sculpture of the valves in *P. biramosa*, *P. cœlata*, *P. orata*, and *P. petholata* to be almost identical.

Hab.—From Auckland to the Bluff, but nowhere common.

10. PLAXIPHORA SUTERI, Pilsbry.

Plaxiphora Suteri, Pilsbry: *Nautilus*, vol. viii (1894), p. 8.

Mopalia ciliata, Sowerby: Hutton, *Man. New Zealand Moll.*, p. 116
(*non* Sowerby).

This handsome Chiton is in size and form not unlike *P. glauca*, Quoy & Gaim., and is only found in exposed situations on rocks, the valves mostly covered with calcareous growth. Young specimens are sometimes found on *Mytilus latus*.

Hab.—From Manukan Harbour to Foveaux Strait; rather rare.

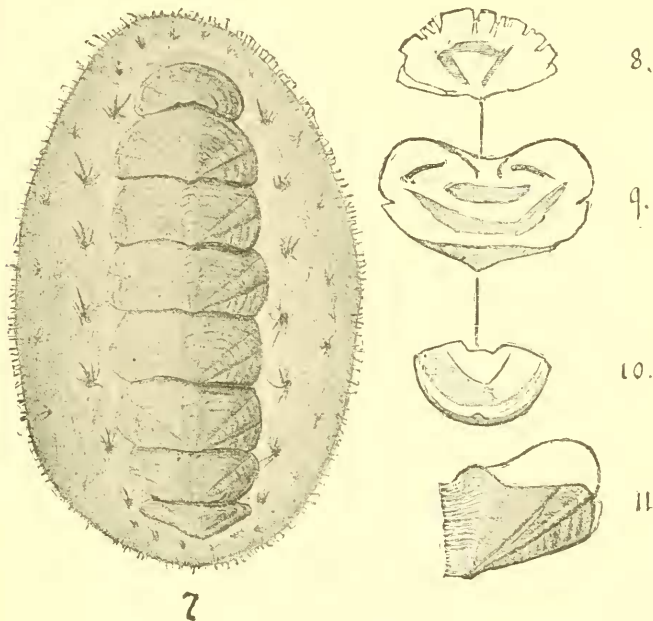
11. PLAXIPHORA SUBATRATA (Pilsbry).

Tonicia atrata, Sowerby: Hutton, *Man. New Zealand Moll.*, p. 114
(*non* Sowerby).

Tonicia subatrata, Pilsbry: *Man. Conch.*, ser. I, vol. xiv (1893), p. 201.

Shell large, oval, moderately elevated; side slopes slightly arched; ridge rounded. Colour reddish-brown, dirty pink at the jugum. The head valve strongly concentrically ridged, and with eight radiate ribs, which, however, sometimes become obsolete. Central valves beaked anteriorly and posteriorly; the anterior beak is rather prominent, rounded, the posterior one pointed, forming an angle of about 120° , and is formed by the outer layer only. The whole surface of the median valves is strongly concentrically striated, following the outline of the anterior beak over the jugum. Lateral areas distinct, raised, with two ribs, which are sometimes flatly nodulous, owing to their being crossed by concentric lines; in some specimens the diagonal ribs are only very faint, or disappear altogether; on the other hand, their number may increase to four, but the anterior and slit-rib are always the more prominent. Posterior valve small, depressed, concentrically ridged, slightly beaked anteriorly; nuchal inconspicuous, terminal. Interior white, tinged with light-blue. Sinus shallow, rounded. Sutural laminae rather broadly rounded. Insertion plates low. Anterior valve with eight irregularly distributed slits; teeth sharp, striated on the outer side; the whole of the interior light-blue. Intermediate valves with one slit on each side; posterior tooth broad; a strong light-blue callosity extends between the two anterior teeth. Posterior valve with the insertion plate thick, rounded, without slits, a small sinus in the middle behind. In all valves the eaves are very narrow and spongy. Girdle wide, narrower at both ends, leathery, tan-colour, dark brown when dry; at each suture a pore with long corneous bristles, six in a tuft, and alternating with these pores a second row of smaller ones is situated near the margin. In front of head and tail valve six smaller pores with short bristles. The margin beset with horny bristles of varying size. Length 75, breadth 45 mm.; divergence 125° (spirit specimen).

A specimen from Campbell Island, belonging undoubtedly to the same species, is of olive-brown colour, the jugum horny-yellow. The anterior valve has well-pronounced radiating riblets, the concentric lines on all the valves are less distinct, and the posterior beak on the central valves is almost obsolete. The ribs on the lateral area of the intermediate valves do not run down to the margin, but are intercepted by a broad, smooth, concentric band, extending along the sides and anterior part of the valves. The valves are more depressed, divergence 135° .



7

Plaxiphora subatrata, Pilsbry.

7. Nat. size, from spirit specimen.

8-10. Ventral view of anterior, median, and posterior valves.

11. Portion of dorsal surface of fourth valve.

Hab.—Macquarie Island (A. Hamilton); Campbell Island.

The Macquarie Island specimens are mostly covered by a thick, white coralline growth, the Campbell Island specimen with Polyzoa.

The specimen from which the figure is drawn is in the Otago Museum; the valves are from specimens kindly given to me by Mr. A. Hamilton.

This may be the *Plaxiphora Campbells*, Filhol (Compt. Rend., xci, 1880, p. 1095; Pilsbry, Man. Conch., ser. I, vol. xv, p. 107).

12. PLAXIPHORA (GUILDINGIA) OBTECTA, Pilsbry.

Plaxiphora obsecta (Cpr.), Pilsbry: Man. Conch., ser. I, vol. xiv (1893), p. 330.

I have not seen this very interesting species, which is not in any of our Museums.

13. PLAXIPHORA (FREMPLYA) OVATA (Hutton).

Acanthochates ovatus, Hutton: Trans. New Zealand Inst., vol. iv, p. 182 (1872).

Acanthochites ovatus, Hutton: Man. New Zealand Moll., p. 117.

Plaxiphora ovata, Hutton: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 332, pl. liv, figs. 34-40.

Hab.—This handsome but rare mollusc is found mostly in roots of *Durvillaea*. Type in the Colonial Museum, Wellington.

SPONGIOCHITON, Carpenter, 1873.

14. SPONGIOCHITON PRODUCTUS, Pilsbry.

Spongiochiton productus (Cpr. MS.), Pilsbry: Man. Conch., ser. I, vol. xiv (1892), p. 26.

I have not seen this species.

ACANTHOCHITES, Risso, 1826.

KEY TO SPECIES.

- | | | |
|------------|--|--------------------|
| <i>a.</i> | Anterior valve without radiating ribs; not obviously lobed around the lower edge of tegmentum. | |
| | <i>b.</i> Tail valve with one slit on each side; girdle covered with spicules and having well-developed tufts. | <i>Zelandicus.</i> |
| | <i>bb.</i> Tail valve with several slits; girdle naked, leathery, covering the valves except for a linear band at the ridge; small tufts on tubercles. | <i>porosus.</i> |
| <i>aa.</i> | Anterior valve having five radiating ribs, its lower margin 5-lobed. Girdle with eighteen small pore tufts. | |
| | <i>b.</i> Girdle leathery, naked, except tufts. | <i>violaceus.</i> |
| | <i>bb.</i> Girdle covered with white spicules, especially at the margin. | <i>costatus.</i> |

15. ACANTHOCHITES ZELANDICUS (Quoy & Gaimard).

Chiton Zelandicus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 400, t. lxxiii, figs. 5-8; Reeve, Conch. Icon., t. xi, fig. 58.

Acanthochites Zelandicus, Quoy & Gaim.: Hutton, Man. New Zealand Moll., p. 117.

Acanthochites Zelandicus, Quoy & Gaim.: Pilsbry, Man. Conch., ser. I, vol. xv, p. 16, pl. xiv, figs. 9, 10.

Acanthochates Hookeri, Gray: Dieffenbach's "Travels in New Zealand," vol. ii (1843), p. 262; Hutton, Trans. New Zealand Inst., vol. iv, p. 182.

Hab.—Found almost everywhere along the coasts of New Zealand with *Chiton pellis-serpentis*. Very variable in colour of mantle and tufts. I found the largest specimens in Dunedin Harbour.

16. ACANTHOCHITES (CRYPTOCONCHUS) POROSUS (BURROW).

Chiton porosus, Burrow: Elements of Conchology (1815), p. 189, pl. xxviii, fig. 1.

Cryptoconchus porosus, Burrow: H. & A. Adams, Genera Rec. Moll., vol. iii, t. lv, fig. 4; Chenu, Manuel de Conch., vol. i, fig. 2884; Hutton, Man. New Zealand Moll., p. 118.

Acanthochites porosus, Burrow: Pilsbry, Man. Conch., ser. I, vol. xv, p. 36, pl. iii, figs. 57-62.

Chiton Leachi, Blainville: Dict. Sci. Nat., vol. xxxvi (1825), p. 554.

Chiton monticularis, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 406, t. lxxiii, figs. 30-5; Sowerby, Conch. Illust., fig. 129; Reeve, Conch. Icon., t. x, fig. 57.

Chitonellus Zelandicus, Gray: Dieffenbach's "Travels in New Zealand," vol. ii (1843), p. 246.

Cryptoconchus Zelandicus, Quoy & Gaim.: Hutton, Trans. New Zealand Inst., vol. iv, p. 183 (*non* Quoy & Gaim.).

? *Cryptoplax depressus*, Blainville: Dict. Sci. Nat., vol. xii (1818), p. 124.

? *Cryptoconchus Stewartianus*, Roeb.: Bull. Soc. Philom. Paris, sér. VII, tom. vi, 1882, p. 194.

Hab.—From Auckland to Stewart Island, on rocks in sheltered situations. Not common.

The mantle sometimes beautifully variegated with orange and light-brown.

17. ACANTHOCHITES (LOBOPLAX) VIOLACEUS (QUOY & GAIMARD).

Chiton violaceus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 403, t. lxxiii, figs. 15-20; Gould, U.S. Explor. Exped. Moll., p. 331, fig. 420 (*non* Reeve, Conch. Icon., fig. 41).

Acanthochates violaceus, Quoy & Gaim.: Gray, Dieffenbach's "Travels in New Zealand," vol. ii, p. 246.

Katharina violacea, Quoy & Gaim.: Hutton, Trans. New Zealand Inst., vol. iv, p. 182.

Acanthochites violacea, Quoy & Gaim.: Hutton, Man. New Zealand Moll., p. 118.

Acanthochites violaceus, Quoy & Gaim.: Pilsbry, Man. Conch., ser. I, vol. xv, p. 39, pl. iii, figs. 67-73.

Chiton porphyreticus, Reeve: Conch. Icon. (1847), t. x, fig. 56.

Acanthochites porphyreticus, Reeve: Hutton, Man. New Zealand Moll., p. 117.

Phacelloptera porphyretica, Carpenter MS.

Hab.—North and South Islands of New Zealand, but very rare in the South.

18. ACANTHOCHITES (LOBOPLAX) COSTATUS, Adams & Angas.

- Acanthochites costatus*, Ad. & Ang.: Proc. Zool. Soc., 1864, p. 194;
Angas, op. cit., 1867, p. 224.
Macandrellus costatus, Ad. & Ang.: Dall, Proc. U.S. Nat. Mus., vol. i,
p. 299, pl. iv, fig. 40 (dentition).
Chiton (*Macandrellus*) *costatus*, Ad. & Ang.: Smith, Zool. Coll.
"Alert," p. 83, t. vi, fig. F.
Acanthochites costatus, Ad. & Ang.: Pilsbry, Man. Conch., ser. I,
vol. xv, p. 40, pl. iii, fig. 74.
Tonicia rubiginosa (Swainson), Hutton: Trans. New Zealand Inst.,
vol. iv (1872), p. 180; Man. New Zealand Moll., p. 114;
Pilsbry, Man. Conch., ser. I, vol. xv, p. 107.

On examining Hutton's type-specimen of *Tonicia rubiginosa*, which is in the Colonial Museum, Wellington, I found it to agree with the description of *A. costatus*, and two specimens I have, which were dredged in Foveaux Straits, also belong to the same species. The specimen in the Colonial Museum has lost its colour entirely, but of my specimens one is yellowish-pink, and the other, a young shell, is most beautifully ornamented with pink, white, light-brown, and blue. The dimensions of Hutton's type-specimen are: length 11, breadth 5 mm.

Hab.—The species has hitherto been found in Cook Strait and Foveaux Strait. In the latter locality it is found with *Chiton canaliculatus*. Very rare.

CHITON, Linné, 1758.

KEY TO SPECIES.

- a. Central areas having longitudinal riblets.
b. Sides and ridge of central areas both sculptured.
c. Lateral areas with numerous slightly crenulated threads.
d. Intermediate valves carinated, divergence 120°. *Quoyi*.
dd. Intermediate valves arched, divergence 100°. *æreus*.
cc. Lateral areas with three or four rows of distinct tubercles. *pellis-serpentis*.
bb. Central areas with a smooth band or triangle on ridge of each valve.
c. Lateral areas with 4-6, pleura 16 or more, granose riblets. *canaliculatus*.
cc. Lateral areas with 2-4, pleura 8-14, nodulose riblets.
d. Girdle-scales mucronated. *limans*.
dd. Girdle-scales not mucronated. *Stangeri*.
aa. Central areas smooth, no longitudinal ribs. *Sinclairi*.

19. CHITON QUOYI, Deshayes.

- Chiton viridis*, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835),
p. 383, t. lxxiv, figs. 23-8 (*non Chiton viridis*, Spengler).
Chiton Quoyi, Deshayes in Lamarck, Anim. sans Vert., vol. vii (1836),
p. 509; Reeve, Conch. Icon., t. xiii, fig. 68; Hutton,
Trans. New Zealand Inst., vol. iv, p. 177; Pilsbry,
Man. Conch., ser. I, vol. xiv, p. 172, pl. xxxvii, figs. 6-8.

? *Chiton glaucus*, Gray: Spic. Zool., pt. i (1828), p. 5.

Chiton glaucus, Gray: Hutton, Man. New Zealand Moll., p. 112.

? *Lophyrus glaucus*, Gray: Angas, Proc. Zool. Soc., 1867, p. 222.

Hab.—Common everywhere. In the South mostly uniformly dark olive-green, sometimes brown.

20. CHITON ÆREUS (Reeve).

Chiton æreus, Reeve: Conch. Icon. (1847), t. vii, fig. 36.

Chiton (Leptochiton) æreus, Reeve: Smith, Voy. "Erebus" and "Terror," Moll., p. 4., t. i, fig. 9.

Chiton æreus, Reeve: Hutton, Man. New Zealand Moll., p. 112; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 179, pl. xxxvi, figs. 96-7.

Chiton siculoides, Carpenter MS.

Carpenter's notes on the species, reproduced by Pilsbry, have enabled me to separate it from the nearly allied *Chiton Quoyi*. In addition to Carpenter's description I wish to point out that light-coloured specimens of *C. Quoyi* show the same bluish colour of the interior as *C. æreus*. Most of my specimens are covered with a blackish-green coat. I found the divergence to be nearly 100° , against 120° in *C. Quoyi*, and the jugum is not carinated, but angled, nor is it always smooth. In one specimen which I took to pieces, the anterior valve has 8, the posterior 15 slits; *C. Quoyi* has 9-10 and 13-14 slits respectively. The shell is also narrower than that of *C. Quoyi*, the proportion of breadth to length being 1 : 1.7 in *C. æreus* and 1 : 1.5 in *C. Quoyi*. The denticulation of the sinus and the crenulation of the teeth are the same in both.

Hab.—The only locality in which I have hitherto found the species is Manukan Harbour, North Island. I have not seen it in any of our New Zealand collections. My specimens are smaller than the type.

21. CHITON PELLIS-SERPENTIS (Quoy & Gaimard).

Chiton pellis-serpentis, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 381, t. lxxiv, figs. 17-22; Deshayes in Lanarek, Anim. sans Vert., vol. vii, p. 508; Reeve, Conch. Icon., t. xv, fig. 84; Hutton, Trans. New Zealand Inst., vol. iv, p. 176; Man. New Zealand Moll., p. 111; Haddon, "Challenger," Polyplacophora, p. 22; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 173, pl. xxxvii, figs. 14-18.

The colour varies from white to brown. I found recently a young specimen of a most beautiful bluish-green, with bands of the same colour on the girdle.

Hab.—This is the commonest of our New Zealand Chitons.

22. CHITON SINCLAIRI, Gray.

Chiton Sinclairi, Gray: Dieffenbach's "Travels in New Zealand," vol. ii (1843), p. 263; Hutton, Trans. New Zealand Inst., vol. iv, p. 177; Man. New Zealand Moll., p. 111; Reeve, Conch. Ieon, t. xxii, fig. 143; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 174, pl. xxxvi, figs. 1-3.

Chiton (Leptochiton) Sinclairi, Gray: Smith, Voy. "Erebus" and "Terror," Moll., p. 4, t. i, fig. 17.

The white stripes or spots are not always present; uniformly brown-black specimens are often met with.

Hab.—North and South Islands of New Zealand, but very local and not common. I am not aware that it has ever been found in Tasmania. Very likely *C. peltis-serpentis* was taken for this species, since it is not always easy to separate them when the specimens are partly worn.

23. CHITON CANALICULATUS, Quoy & Gaimard.

Chiton canaliculatus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 394, t. lxxv, figs. 37-42.

Chiton (Lophyrus) canaliculatus, Quoy & Gaim.: Hutton, Trans. New Zealand Inst., vol. iv, p. 176.

Lepidopleurus canaliculatus, Quoy & Gaim.: Hutton, Man. New Zealand Moll., p. 112.

Chiton canaliculatus, Quoy & Gaim.: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 177, pl. xxxvi, figs. 4-6.

Chiton Stangeri, Reeve: Pilsbry, l.c. (*non* Reeve).

Chiton insculptus, A. Adams: Proc. Zool. Soc., 1852, p. 91, t. xvi, fig. 4; Hutton, Man. New Zealand Moll., p. 112.

Hab.—In deep water: Cook Strait, Dunedin, Foveaux Strait.

24. CHITON STANGERI, Reeve.

Chiton Stangeri, Reeve: Conch. Ieon. (1847), t. xxii, fig. 150; Hutton, Man. New Zealand Moll., p. 111.

In size, shape, coloration, and sculpture very much like *Chiton limans*, but differing in the following points:—The ribs have *no acute, elevated grains*, but are flattened. The tail valve has very distinct, flatly nodulous ribs. The jugum is less acute, divergence 120° . The imbricating scales of the girdle are very small on both margins, larger in the middle, shining, *not mucronated*, and very faintly striated, the striae being visible only under strong magnifying power. Length 13, breadth 8 mm.

This *Chiton* may be considered to stand in the same relation to *Chiton limans* as our *Ischnochiton longicybus* to *I. crispus* of Tasmania and Australia. For comparison I had a specimen of *Chiton limans* from Port Jackson.

It is evident that this species ranks as very distinct from *C. canaliculatus*, with which it has been thought to be identical.

Hab.—I found a single specimen of this evidently rare *Chiton* in Lyttelton Harbour, under a stone at low-water.

25. CHITON LIMANS, Sykes.

- Chiton muricatus*, A. Adams : Proc. Zool. Soc. 1852 (May, 1854), p. 91, pl. xvi, fig. 6 (*non* Tilesius, Mém. Acad. Sci. St. Petersburg, ser. V, vol. ix, 1824, p. 483); Pilsbry, Man. Conch., ser. I, vol. xiv, p. 175, pl. xxxvii, figs. 12, 13.
- Lophyrus muricatus*, Ad. : Angas, Proc. Zool. Soc., 1865, p. 186; l.c., 1867, p. 222.
- Chiton (Lepidopleurus) sulcatus*, Quoy & Gaim. : Hutton, Trans. New Zealand Inst., vol. iv, p. 178; Man. New Zealand Moll., p. 112 (*non* Quoy & Gaim.).
- Chiton limans*, Sykes, nom. nov. : Proc. Malac. Soc. London, vol. ii (1896), p. 93.

There are two specimens in the Colonial Museum from Kapiti, Cook Strait, which were considered by Captain Hutton to be *Chiton sulcatus*, Quoy & Gaim. The specimens are not in a very good condition, one is partly broken, and their original colour is gone. A close examination of them, as far as this was possible, proved them to be *C. limans*, the scales being mucronated. These are the only specimens known to have been found in New Zealand waters.

Hab.—Cook Strait.

EUDOXOCHITON, Shuttleworth, 1853.

KEY TO SPECIES.

- a. Shell elevated, divergence 100-110°, anterior valve with 30 slits, spinelets black. *nobilis*.
- aa. Shell depressed, divergence 135-140°, anterior valve with 17 slits, spinelets brown. *Huttoni*.

26. EUDOXOCHITON NOBILIS (Gray).

- Acanthopleura nobilis*, Gray : Dieffenbach's "Travels in New Zealand," vol. ii (1843), p. 245.
- Chiton (Eudoxochiton) nobilis*, Gray : Shuttleworth, Mitth. Naturf. Gesell. Bern, 1853, p. 191.
- Acanthopleura nobilis*, Gray : Hutton, Trans. New Zealand Inst., vol. iv, p. 181.
- Chiton (Chatopleura) nobilis*, Gray : Smith, Voy. "Erebus" and "Terror," Moll., p. 4, t. i, fig. 8.
- Chatopleura nobilis*, Gray : Hutton, Man. New Zealand Moll., p. 115.
- Eudoxochiton nobilis*, Gray : Pilsbry, Man. Conch., ser. I, vol. xiv, p. 193, pl. xlvi, figs. 88-95.

This rare species attains sometimes a large size. I have a specimen measuring 62 × 110 mm. ! It is the largest of New Zealand Chitons.

Hab.—North and South Islands, on rocks in exposed situations, sometimes together with *Pluxiphora biramosa* and *P. Suteri*.

27. EUDOXOCHITON HUTTONI, Pilsbry.

Eudoxochiton Huttoni, Pilsbry: Man. Conch., ser. I, vol. xiv (1893), p. 194, pl. xlvi, figs. 96-100.

Hab.—North and South Islands, but very rare.

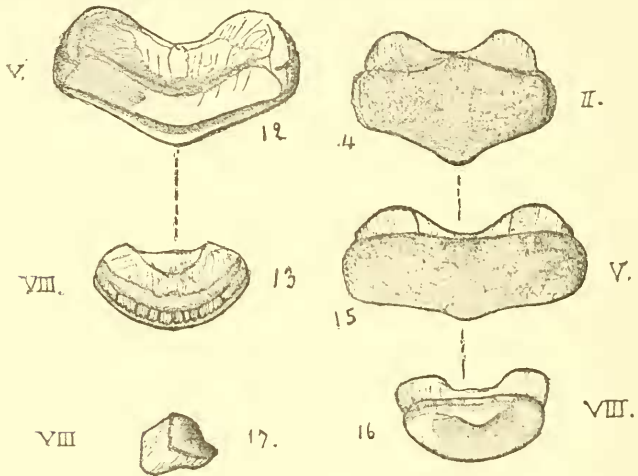
ACANTHOPLEURA, Guilding, 1829.

28. ACANTHOPLEURA (MAUGERIA) CORTICATA (Hutton).

Tonicia corticata, Hutton: Trans. New Zealand Inst., vol. iv (1872), p. 180; Pilsbry, Man. Conch., ser. I, vol. xiv, p. 320.

Plaxiphora biramosa, Quoy & Gaim.: Hutton, Man. New Zealand Moll., p. 116 (*non* Quoy & Gaim.).

A specimen of a rather large Chiton was kindly given me by Mr. A. Hamilton, of Dunedin. I had not seen the species before, and I submitted it to Captain Hutton for examination, who declared it to be his *Tonicia corticata*. The specimen is in a bad condition, in so



Acanthopleura corticata, Hutton.

12-13. Ventral views of detached valves.

14-16. Dorsal views of detached valves.

17. Profile of posterior valve, nat. size.

far that the valves are separated from the girdle, the head valve is missing, and the girdle is much worn; it, however, is quite sufficient to make out the generic position with certainty, and to add a little to the diagnosis published by Captain Hutton twenty-four years back. The shell is broadly and roundly arched, the surface much eroded or covered with coralline growth. Colour yellowish-grey, with a brown stripe on the ridge of the valves, and one, much broader, on each side near the margin. The valves are beaked, thick, and solid, with the

lateral areas indistinctly raised. The margins of the lateral areas and pleura show distinct granules (surrounded by numerous eye-dots). The mucro seems to be central, but this is uncertain, since the surface of the terminal valve has been scraped with a knife. Interior lead-grey on posterior half of intermediate valves, white on anterior half and tail valve. Central valves with 1-1, posterior valve with 9, slits. Teeth rather long and very deeply pectinated outside in a forward direction. Tegmentum inflexed at the posterior margin of central valves. Teeth of end valve short, deeply pectinated on the edge and outside. On central valves a well-defined ridge runs across between the slits, following in outline the sinus and sutural laminae. Sinus deep, rounded, almost straight in the tail valve; slightly notched at the sides. Girdle (dry) dark-brown. In one place I found five small calcareous spicules. The whole of the girdle is densely covered by small pits, in which the lost spines were inserted, imparting to it a somewhat spongy appearance.

It is difficult to give an exact measurement of this shell, but I estimate it at about: length 75, breadth 50 mm.

The central valves are more broadly arched than in *Acanthopleura granulata*, Gmel.

Hab.—New Zealand, exact locality not known.

ONITHOCHITON, Gray, 1847.

29. ONITHOCHITON UNDULATUS (Quoy & Gaimard).

Chiton undulatus, Quoy & Gaim.: Voy. Astrolabe, Zool. vol. iii (1835), p. 393, t. lxxv, figs. 19-24; Reeve, Conch. Icon., t. xvi, figs. 87, 90.

Onithochiton undulatus, Quoy & Gaim.: H. & A. Adams, Genera Rec. Moll., vol. i, p. 476, t. liv, fig. 3.

Tonicia undulata, Quoy & Gaim.: Hutton, Trans. New Zealand Inst., vol. iv, p. 179; Man. New Zealand Moll., p. 114.

Onithochiton undulatus, Quoy & Gaim.: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 245, pl. lv, figs. 14-16.

Tonicia lineolata, Fremby: Hutton, Man. New Zealand Moll., p. 114 (*non* Fremby).

Mr. H. A. Pilsbry was quite right when he expressed the opinion (Man. Conch., ser. I, vol. xv, p. 89) that *Tonicia lineolata* reported from Dunedin, Auckland Islands, and Campbell Island, was not likely to be the Chilean form described in vol. xiv, p. 198. The specimens from the localities mentioned are in the Otago Museum, and they show the colour pattern of *T. lineolata*, but I found them all to be undoubted *O. undulatus*. The colour variation in this species is greater than in any other Chiton I know. Sometimes the colour is uniformly purplish-black, and this form is more common in the South, especially in the Auckland Islands and Campbell Island.

Hab.—All the Southern New Zealand Islands. Often found in roots of *Durrillea* with *Chiton Sinclairei* and *Placiphora ovata*.

SPECIES DOUBTFUL FOR NEW ZEALAND.

1. *CHITON JUGOSUS*, Gould.

Chiton concentricus, Reeve: Hutton, Trans. New Zealand Inst., vol. iv (1872), p. 176; Man. New Zealand Moll., p. 111.

Some specimens in the Colonial Museum are correctly referred to this species, but their locality is not stated. I agree with Pilsbry that the species is probably incorrectly reported from New Zealand. It is not in the New Zealand collections in any of the other Museums, and I am not aware that it has ever been found in our waters by recent collectors.

2. *LORICA VOLVOX* (Reeve).

Chiton (Lepidopleurus) rudis, Hutton: Trans. New Zealand Inst., vol. iv (1872), p. 179; Man. New Zealand Moll., p. 113.

Chiton rudis, Hutton: Pilsbry, Man. Conch., ser. I, vol. xiv, p. 238.

I have examined Hutton's type-specimen of *Chiton rudis* in the Colonial Museum, and found it, as suggested by Mr. Pilsbry, to be *Lorica volvox*. For the same reasons as those given in the case of the foregoing species, I think it advisable to place it amongst the species doubtful for New Zealand.

3. *ISCHNOCHITON CONTRACTUS* (Reeve).

Lepidopleurus contractus, Reeve: Hutton, Man. New Zealand Moll., p. 113.

The New Zealand habitat rests solely on Cuming's authority, and that is not always reliable. It is not in any of our Museums as coming from New Zealand, and I have no knowledge that it has ever been found here.

INSUFFICIENTLY DESCRIBED SPECIES.

1. *Lepidopleurus melanterus*, Rochebrune: Pilsbry, Man. Conch., ser. I, vol. xv, p. 107.
2. *Lepidopleurus Campbeli*, Filhol: Pilsbry, l.c.
3. *Piaxifora Campbeli*, Filhol: Pilsbry, l.c.
4. *Acanthochites jucundus*, Rochebrune: Pilsbry, t.c., p. 29.
5. *Tonicia Gryei*, Filhol: Pilsbry, t.c., p. 107.
6. *Acanthopleura complexa*, Hutton: Trans. New Zealand Inst., vol. iv, p. 181; Pilsbry, t.c., p. 108. Type lost.
7. *Onithochiton Filholi*, Rochebrune: Pilsbry, t.c., p. 106.
8. ,, *decipiens*, Rochebrune: Pilsbry, l.c.
9. ,, *neglectus*, Rochebrune: Pilsbry, l.c.
10. ,, *Astrolabei*, Rochebrune: Pilsbry, t.c., p. 107.